THE DRY MATTER CONTENT CHANGES OF SPICE PEPPER CULTIVATED UNDER PLASTIC COVER

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ABSTRACT
The main objective of our research work consists in determining the particular plant density suitable for spice pepper hybrids and in elaborating the trellis system and the pruning method. In the second year of the series of experiments over several years we examined the effect of plant density, picking frequency and trellis type on yields and fruit quality. In this publication we discuss the change of dry matter content of each picking. Plants were arranged in twin rows (90+40)x38; x34; x30 plant spacing. Four independent replications were used. Plants had two stems and 4 of them were planted on each m2. According to our results only the picking frequency influenced on the dry matter content out of three technological elements in our experiment.

Key words: pepper, plastic cover, plant density, picking time, dry matter content

INTRODUCTION

The spice pepper growing area decreased by 25% over the previous year, 2009: 2000ha, 2010:1500ha (FRUITVEB, 2010) in Hungary. The decrease was caused by ecological and economic changes. Due to the climate changes the risk of traditional spice pepper growing (outdoor, sowed or planted) have been increased concerning both the yield and the terms of quality. The growing risk is much higher without proper proportion of the individual living condition (temperature, light) so the quality values are not formed by a high level, as under protected and controlled conditions. Growing under plastic cover proves to be suitable production technology that can result earlier onset of picking, increased number of pickings, better quality (purity, in the first place), better (and cheaper) post harvest maturation and therefore higher quality of the ground product.
The crucial issue of production technology under plastic cover is plant density. 4-4.5-5 plants per square meter could be the optimal plant density. The pruning method and the trellis system are correlated with plant density and have determinant influence on the amount of light that plants receive the micro-climate, plant protection and the number of pickings. In the intensive growing of green pepper under unheated greenhouse conditions it is the two stem pruning that has become widespread (DASGAN – ABAK, 2003; GYÚRÓS – SZŐRINÉ, 2005), in contrast to the less intensive technology where a cordon trellis system is used (ZATYKÓ, 2000, DUROVKA ET AL., 2006).
Since with cultivation under plastic cover higher yield can be achieved more water and nutrients are needed compared to conventional open field (extensive) crop production. Multiple picking requires a continuous plant growth. It can be reached by fertilizing several times a week or even every day with a fertilizer that provides immediately available nutrients for the plants (TERBE, 2009). When fertilizing we need to focus on potash supply, since the formation of pigments are strongly influenced by potassium (IRINYI – KAPITÁNY, 2004).
The increased number of pickings increases total yields as with the removal of ripen fruits

plants are relieved and therefore are permitted to develop and mature other fruits at high quality (DUROVKA ET AL., 2006).
The average dry matter content of fruits is significantly higher in the case of single-pass harvest(single picking) than case of multi picking.
(SOMOGYI, 2010).
Composition parameters are influenced by several production technology factors, starting from fertilizer application to the timing of harvest (BELAKBIR ET AL., 1998; BOSLAND - VOTAVA 2000; ANCHONDO ET AL., 2001; IRINYI – KAPITÁNY, 2004; IRINYI – SLEZÁK, 2006A,B.; GYÖKÖS ET AL., 2009).
The main objective of our research work consists in determining the particular plant density suitable for spice pepper hybrids and in elaborating the trellis system and the pruning method. In the second year of the series of experiments over several years we examined the effect of plant density, picking frequency and trellis type on yields and fruit quality. In this publication we discuss the change of dry matter content of each picking.

MATERIAL AND METHOD

The experiment was set up at the Experimental and Training Farm of the Faculty of Horticulture, Corvinus University of Budapest, using the (indeterminate) variety ***Délibáb***. It was cultivated under plastic cover, between unheated conditions.

Main technological parameters of the experiment:
Seedling raising was carried out in KITE trays with 96 cells (400 plants/m^2), in seedling soil POT 20, with sowing date 8th March. Planting-out took place on the 22thApril.

Treatments:

	Cordon	Plant density (plant/m^2)	Number of picking
1.	Vertical	4	2
2.		4	3
3.		4	4
4.		4.5	2
5.		4.5	3
6.		4.5	4
7.		5	2
8.		5	3
9.		5	4
10.	Horizontal	4	2
11.		4	3
12.		4	4
13.		4.5	2
14.		4.5	3
15.		4.5	4
16.		5	2
17.		5	3
18.		5	4

We used two type of trellis system: vertical and horizontal cordon trellis system.

Plants were arranged in twin rows (90+40)x38 cm; (90+40)x34 cm; (90+40)x30 cm plant spacing. Four independent replications were used.

The plant number per square meter was 4; 4.5; 5.

At vertical trellis system, the stems were trained vertically. After the two stem shaping pruning the main shoots were wound around the string and only branching lateral shoots were broken off above 2-3 internodes.

A preventive plant protection was used in the plastic tunnel against eventual infection by aphids, greenhouse whitefly, cotton bollworm, trips and powdery mildew. (Consequently, no yield loss from pest was observed.)

Picking dates according to the respective treatments are included in *Table 1*.

Table 1. Picking dates (Budapest, 2011).

Date of picking \ Treatments																	
	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**	**17.**	**18.**
02.08.			X			X			X			X			X			X
30.08.		X	X		X	X		X	X		X	X		X	X		X	X
28.09.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18.10.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

At the pickings, in order to observe vegetative plant development, the longer main stem of each plant was measured. Pickings were carried out in the state of biological maturity of fruits.

RESULTS AND CONCLUSIONS

Although no statistical difference can be observed between the trellis system, and plant density, but the picking frequency showed a difference. Dry matter content of fruits was the highest (40.82%-70.80%) in case of first picking in the two times harvested parcels (**1;4;7;10;13;16**). Also the first picking provided the highest dry matter content (24.48%) in three times harvested fruits (**2;5;8;11;14;17**). However in four times harvested parcels (**3;6;9;12;15;18)** measured the lowest dry matter content (13.58%) in case of first picking . The three other pickings gave about the same average value. (*Figure 1-2*).

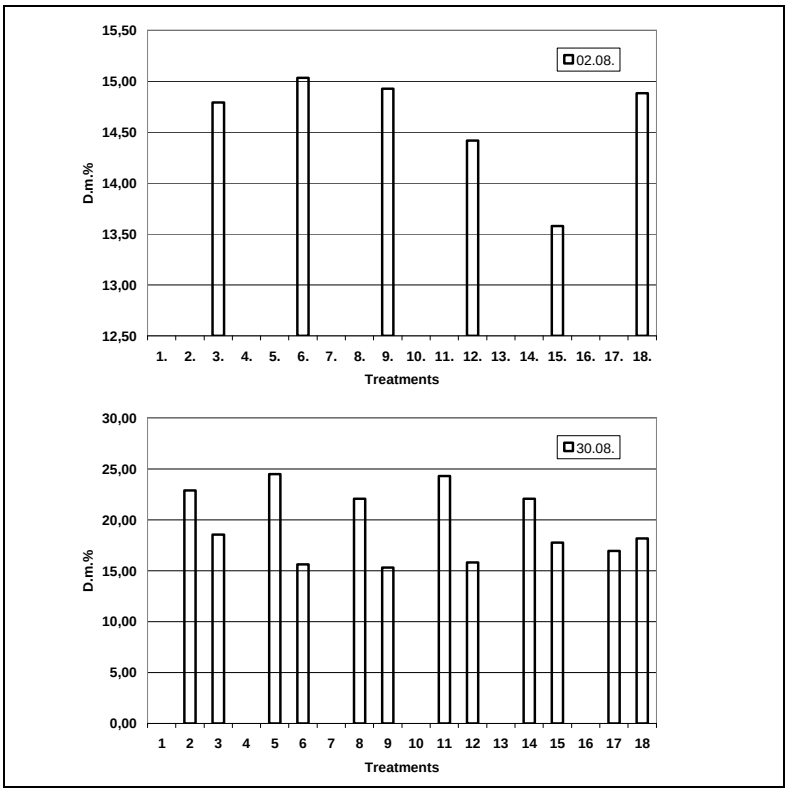

Figure 1. Effect of first and second pickings on dry matter content

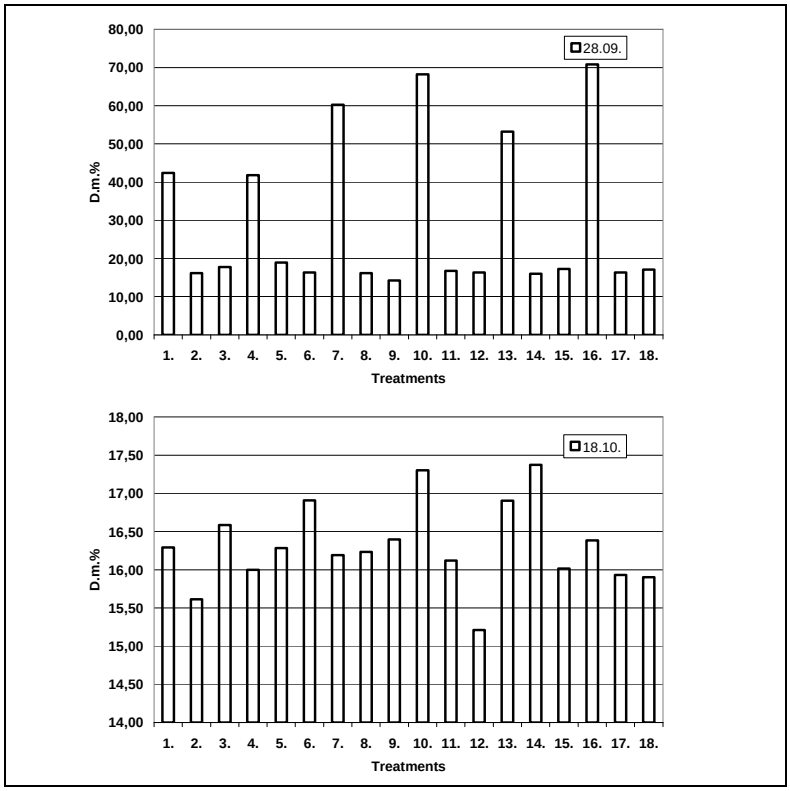

Figure 2. Effect of third and fourth pickings on dry matter content

Figure 3. shows trend of harvested fruitweights weighted annual average dry matter content.

Also the picking frequency showed statistically demonstrated difference.
The average annual dry matter content in the two times harvested parcels is 48.38%. However most frequently picked parcels dry matter content is low 15.95%.
It is true that, there is no statistically significant difference between the trellis systems, but average values showing horizontal cordon result in higher dry matter content (30.23%), than the vertical cordon.

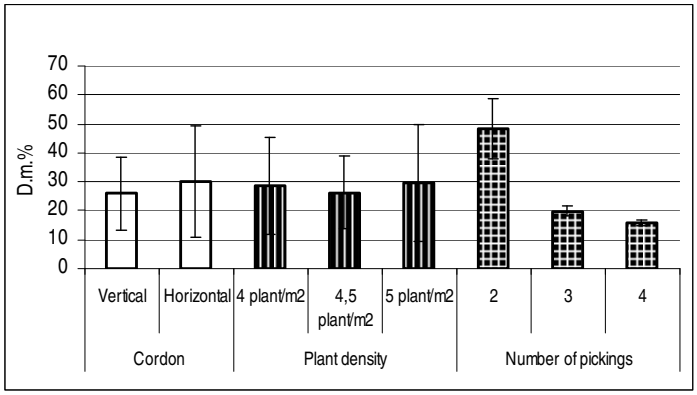

Figure 3. Trend of fruitweights weighted annual average dry matter content

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